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10/622,175	07/17/2003	Andrew R. Adams	CISCO-7343	2151

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DOV ROSENFELD
5507 COLLEGE AVE
SUITE 2
OAKLAND, CA 94618

EXAMINER	
JACKSON, BLANE J	
ART UNIT	**PAPER NUMBER**
2618	

DATE MAILED: 05/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/622,175	ADAMS ET AL.	
	Examiner	Art Unit	
	Blane J. Jackson	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 April 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *38 and 39* is/are allowed.

6)☐ Claim(s) *1-8,11,12,15-17,30,40,41 and 43* is/are rejected.

7)☒ Claim(s) *9,13,14,18-29,32-37,42 and 44* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments and amendment, see Remarks, filed 10 April 2006 with respect to the rejection(s) of claim(s) 1-41 under Kang have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Oshima et al. and Kang.

Claim Objections

Claims 9 and 42 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 9, which is dependent on claims 6 and 1, includes the claim element "wherein the digital signals from the ADC provide a measure of the signal strength post-digitization to the AGC controller" and "wherein the AGC controller is to set the gains of the pre-filter section, the first post-filter section and the second post filter section *according to the pre-filter and post-filter signal strength measures and the post-digitization signal strength measure*" which is in direct conflict with claim 1 of "such that the gain settings of the pre-filter and first post filter variable gain elements do not require use of the digital output signal of the ADC".

Claim 42, which is dependent on claims 8, 5, 4, 2 and 1, includes the element "such that after the first stage, the AGC controller can set the gain of the second post filter section according to at least the post-digitization signal strength measure" which is in direct conflict with claim 1 of "such that the gain settings of the pre-filter and first post filter variable gain elements do not require use of the digital output signal of the ADC".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-8, 11, 12, 15-17, 30, 40, 41 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oshima et al. (US 6,927,628) in view of Kang et al. (US 6,498,927).

As to claims 1 and 11, Oshima teaches a digital radio receiver and method for controlling the gain of a radio receiver comprising:

A receive signal path including:

A filter (figure 1, column 3, lines 22-43, filter (6) or figure 10, filter (104)),

At least one post-filter section after the filter including a first post filter section immediately after the filter, the post filter sections each including at least one adjustable gain element to provide an adjustable gain to the post-filter section (figure

10, column 7, lines 28-39, an embodiment of the *IF or baseband section* of the receiver including filter (104) followed by two or more sections or stages comprised of a power detector, filter and adjustable amplifiers to be followed by an ADC (117)),

A first post-filter signal strength detector coupled to the first pre-filter section to provide a measure of the relative strength of the signal at a first post filtering point in the receive signal path after filtering by the filter (figure 10, peak hold circuit (HP2)), the first post-filter signal strength detector having an output coupled to a second analog to digital converter and a second calibrator to provide a second multi-bit calibrated measure of the relative strength of the signal at the first post –filtering point (figures 10 and 12, column 8, lines 6-18, level detector (LV2) functions like an ADC and calibrator with a multi-bit digital output),

An automatic gain controller coupled to the outputs of the first and second calibrators of the pre-filter and first post-filter signal strength detectors and further coupled to the variable gain elements to set the gains of the respective sections according to the pre-filter and first post-filter multi-bit calibrated signal strength measures (figure 10, gain controllers (107) and (111), column 8, lines 32-43, the gain controllers implemented as an digital computer), the setting being to respectively set the pre-filter signal strength and the first post-filter signal strength to a desired pre-filter signal power and a desired first post-filter signal power respectively, the gains setting providing an overall gain setting for the receive path (column 7, line 46 to column 8, line 5, with signal detection at each section/stage, the gain control circuits switch all the gains of the adjustable amplifiers into the appropriate values all at once).

A main analog to digital converter configured to convert the output of the last analog section in the receiver signal path to a digital output signal (figure 10, ADC (117)),

Such that the gain settings of the first post filter variable gain elements adapt to achieve the desired filter signal powers according to the signal characteristics and take into account the amount of filtering provided by the filter and such that the gain settings of the first post filter variable gain elements do not require use of the digital output signal of the ADC (figure 10, column 7, lines 41-45, the ADC is clocked but the output is not used in the determination of the gain setting of the baseband stages/sections. Note, to avoid confusion, the circuit of figure 6 is referenced in the discussion for figure 10 but the functions of the respective ADC's are different: the ADC (610) of figure 6 is dual purpose, used for gain control and normal receiver operations, but the embodiment of figure 13 clearly separates the AGC and normal receiver functions between ADC (610) and ADC (615) respectively).

. Oshima teaches a general digital receiver in figure 1 comprising a "pre-filter section prior to the filter" (antenna, LNA (2) and mixer (4)), a filter (6) and "at least one post-filter section" (adjustable amplifier (7) and filter (8)) followed by the necessary ADC (10) and decoder (11) but does not teach a pre-filter section prior to the filter including at least one adjustable gain element to provide an adjustable gain to the pre-filter section and a pre-filter signal strength detector coupled to the pre-filter section to measure the relative strength of the signal at a point in the receive signal path prior to filtering by the filter.

Kang teaches a direct conversion digital receiver with automatic gain control comprising a pre-filter section (figure 8, antenna, filter (806), LNA (810) and mixer (816) prior to a filter (baseband or IF filter (836)) including at least one adjustable gain element (LNA (810)) to provide an adjustable gain to the pre-filter section and a pre-filter signal strength detector coupled to the pre-filter section (power detector (820) to measure the relative strength of the signal at a point in the receive signal path prior to filtering by the filter, figure 8, column 7, line 67 to column 8, line 34.

Since Oshima discloses several embodiments, none limited to three detector/amplifier/filter stages (column 7, lines 28-32), it would have been obvious to one of ordinary skill in the art at the time of the invention realize a gain adjusted/ power monitored RF section in the receiver of Oshima as taught by Kang for gain and linearity control of all gain stages in a receiver.

As to claim 2, Oshima teaches a receiver as recited in claim 1 wherein the AGC controller corrects and averages each of the pre-filter and first post-filter signal strength indications, compares the pre-filter and post-filter corrected averaged signal strength indications to respective pre-filter and post-filter desired signal powers and adjusts the gains of the respective sections to reduce the differences between the corrected averaged indications and desired signal powers (column 1, line 64 to column 2, line 9, calculates the optimum gains of the PGAs on the basis of the result of the level detection).

As to claim 3 with respect to claim 2, Oshima teaches the correction of the pre-filter and first post-filter signal strength indications is to bring the indications to a common scale so that the indications may be compared and wherein the adjusting of the gains of at least one of the sections depends on both the pre-filter and first post-filter corrected and averaged signal strength indications (column 8, lines 6-30, level detector comprises a parallel type ADC which may be configured to apply a logarithmic conversion).

As to claim 4 with respect to claim 2, Oshima teaches the AGC controller operates in sequential stages, each stage setting the gains of one or more sections to achieve desired signal strength levels including the desired pre-filter signal strength level and a desired post-filter signal strength levels, the adjustment of each section being by a variable amount that depends on the calibrated measures of the relative strength (figures 10 and 12, column 7, lines 28-67).

As to claim 5, Oshima teaches a receiver as recited in claim 4 wherein a first stage sets the gain of the pre-filter section according to the pre-filter signal strength indication and sets the gain of the first post filter section according to both the pre-filter signal strength indication and the first post-filter signal strength indication and other stages finalize the gain setting of any other post-filter sections according to additional signal strength indications from the relevant sections (column 9, lines 1-10, general microprocessor and software detects input levels of the programmable gain amplifiers,

calculates optimum values of gains for each and executes gain control for each amplifier at substantially the same time).

As to claim 6, Oshima teaches a receiver as recited in claim 1 wherein the receive signal path includes an RF section operating at RF and an intermediate frequency IF section after the RF section operating at an intermediate frequency and wherein the filter is in the intermediate frequency section of the receive signal path (figure 1, column 3, lines 21-43, a direct conversion low IF receiver).

As to claim 7, Oshima teaches a receiver as recited in claim 1 wherein the desired pre-filter signal power and a desired post-filter signal power are selected in order to maximize the signal to noise and distortion at the end of the respective sections (column 3, lines 34-43).

As to claim 8, Oshima teaches a receiver as recited in claim 5 wherein the first post-filter signal strength detector is coupled to the first pre-filter section and wherein at least the first stage sets the gain of the pre-filter section and first post filter section to bring the input of the ADC to within the range of the ADC (figure 10, column 9, lines 1-10 and column 3, lines 35-39, the gain controllers (103, 107 and 111) are interpreted as parts of a single gain controller that receives the signal power of each amplifier stage in both sections and calculates an optimum value for each to match the dynamic range of the ADC).

As to claim 10, Oshima teaches a receiver as recited in claim 6 wherein the signal path includes a second filter between any variable gain element in the first post-filter section and any variable gain element in the second post-filter section such that the gain setting takes into account the amount of filtering by the second filter in addition to the amount of filtering by the first filter (figure 10, output of filter (104) and input to amplifier (106) is tracked by peak hold (PH2) and output of filter (108) and the input of amplifier (110) is tracked by peak hold (PH3)).

As to claim 12, Oshima teaches a method as recited in claim 11 wherein the accepting of the measures includes calibrating the pre and post filter signal strength measures so that they may be compared (column 8, lines 6-44, level detector LV1, LV2 and LV3 digitize or calibrate and apply a logarithmic conversion to the detected signal for manipulation in the gain controller).

As to claims 15, 30 and 40, Oshima teaches an AGC gain controller and a carrier medium carrying one or more computer readable code segments to instruct one or more processors of a processing system to carry out a method for controlling the gain of a radio receiver for receiving packets of information (column 8, lines 32-67), the receiver connected to an antenna subsystem (figure 1, antenna (1)), the receiver including a receive signal path including a plurality of sections including a first section coupled to the antenna subsystem and a next section and an analog to digital converter coupled to

the output of the last analog section in the receiver signal path to output a digital output signal, *the baseband/IF section* having an adjustable gain and able to provide a multi-bit calibrated measure of the signal strength at its output, the method comprising:

Waiting for a start of packet indication (figure 2, column 3, lines 44-54),

Providing multi-bit calibrated measures of the signal strengths at the outputs of the section (figure 12, column 8, lines 6-36, level detector (LV1-3) provide digitized logarithmic scaled signal power values),

Adjusting the gains of the first and the next sections using the provided measures of signal strength, the adjusting being to respectively set the signal strength at respective outputs of the sections to respective desired levels in order to set the overall gain of the receive signal path (column 7, line 58 to column 8, line 5, gain control determines the appropriated value and applies to all stages at the same time and column 3, lines 34-43, overall gain is set to match the dynamic range of the ADC (117)),

Such that the gain adjusting of at least the first section does not require use of the digital output signal from the ADC (figure 10, column 7, lines 41-45, ADC (117) is clocked but the output is not used in the determination of the gain setting of the baseband stages/sections. Note, to avoid confusion, the circuit of figure 6 is referenced in the discussion for figure 10 but the functions of the respective ADC's are different: the ADC (610) of figure 6 is dual purpose, used for gain control and normal receiver operations, but the embodiment of figure 13 clearly separates the AGC and normal receiver functions between ADC (610) and ADC (615) respectively).

. Oshima teaches a general digital receiver in figure 1 comprising a “pre-filter section prior to the filter” (antenna, LNA (2) and mixer (4)), a filter (6) and “at least one post-filter section” (adjustable amplifier (7) and filter (8)) followed by the necessary ADC (10) and decoder (11) but does not teach a pre-filter section prior to the filter including at least one adjustable gain element to provide an adjustable gain to the pre-filter section and a pre-filter signal strength detector coupled to the pre-filter section to measure the relative strength of the signal at a point in the receive signal path prior to filtering by the filter.

Kang teaches a direct conversion digital receiver with automatic gain control comprising a pre-filter section (figure 8, antenna, filter (806), LNA (810) and mixer (816) prior to a filter (baseband or IF filter (836)) including at least one adjustable gain element (LNA (810)) to provide an adjustable gain to the pre-filter section and a pre-filter signal strength detector coupled to the pre-filter section (power detector (820) to measure the relative strength of the signal at a point in the receive signal path prior to filtering by the filter, figure 8, column 7, line 67 to column 8, line 34.

Since Oshima discloses several embodiments that are not limited to three detector/amplifier/filter stages (column 7, lines 28-32), it would have been obvious to one of ordinary skill in the art at the time of the invention realize a gain adjusted/ power monitored RF section in the receiver of Oshima as taught by Kang for gain and linearity control of all gain stages in a receiver.

As to claim 16, Oshima teaches a method as recited in claim 15 further comprising setting the gains of the sections to a default level prior to waiting for a start of packet information (column 4, lines 9-16, initial gains are set to voluntary values)

As to claim 17, Oshima teaches a method as recited in claim 15 wherein the receiver includes a filter in the receive signal path, the providing a measure of the signal strength at the output of the first section being at a point before the filter and the providing a measure of the signal strength at the output of the next section being at a point after the filtering (figure 10, filter (104), the method further comprising:

Correcting the provided measures of signal strength at the outputs of the first section and next section to determine measures on a common scale such that the corrected measures may be compared (column 8, lines 6-36, level detector (LV1-3) provide a digitized output that is logarithmic scaled to managed the large dynamic range of a PGA),

Wherein the gain adjusting adjusts at least one of the first or next section's gain according to both the provided measure of signal strength at the output of the first section and at the output of the next section (column 7, lines 58-67).

As to claim 31, Oshima teaches an AGC controller as recited in claim 30, wherein the receiver includes a filter in the receive signal path, the signal strength measurer of the first section provides a measure of the signal strength at a point before the filter (figure 10, filter (104), peak hold (PH1)/ level detector (LV1) as modified in the

first section by Kang), and the signal strength measurer of the next section provides a measure of the signal strength at a point after the filter (peak hold (PH2)/level detector (LV2)), such that the gain adjusting sets the first section's gain according to the accepted measure of signal strength at the output of the first section and sets the next section's gain according to the accepted measure of signal strength at the output of the next section relative to the accepted measure of signal strength at the output of the first section (column 7, lines 40-67).

As to claim 41, Oshima teaches a method as recited in claim 40 wherein the receiver includes a filter in the receive signal path, the measuring at the first stage being at a point before the filter, and the measuring at the second AGC stage being at a point after the filtering (figure 10, filter (104), first AGC stage: peak hold (PH1)/ level detector (LV1) as modified in the first section by Kang and the second AGC stage: (peak hold (PH2)/level detector (LV2)).

As to claim 43, Oshima teaches a method as recited in claim 15 wherein the desired levels are selected in order to maximize the signal to noise and distortion at the end of the respective stages (column 3, lines 34-43).

Allowable Subject Matter

Claims 13, 14, 18-29, 32-37 and 44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 38 and 39 are allowed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Parssinen et al. (US 6,993,291) and Darabi et al. (US 2003/0181184).

Of particular relevance but predated by the applicant's filling date is Oshima et al. (US 7,005,922), see figures 10 and 11.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Blane J. Jackson whose telephone number is (571) 272-7890. The examiner can normally be reached on Monday through Friday, 9:00 AM-6:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BJJ

EDWARD F. URBAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600